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10/670,110	09/24/2003	M. Turhan Taner	RSI-03-02	7185

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P.O. Box 1247
Richmond, TX 77406-1247

EXAMINER

HUGHES, SCOTT A

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 04/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/670,110

Applicant(s)

TANER, M. TURHAN

Examiner

Scott A Hughes

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,5,6,8,9,11,15,16,18 and 19 is/are rejected.
- 7) ☒ Claim(s) 2-4,7,10 and 12-20 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: ____.

DETAILED ACTION

Drawings

The drawings, figures 1 and 2, are objected to. Fig. 1 is too informal and should be resubmitted in a form that is not a handwritten flow chart so that it is easier to read. Fig. 2 is not clear enough to determine to which parts of the figure the arrows representing the trend 36, local variation 38, and anomalous zone 40 are pointing. The arrow for the trend 36 appears to be pointing to the darkened area above the white line. It is unclear if this darkened area is the trend, or if the white line is the trend. If the white line is not the trend, it should be labeled so that all aspects of the drawing are clear. It is also unclear as to whether the arrow representing the local variation 38 is pointing to the black line in the figure or if it is pointing to one of the light or dark sections around the two lines. Also, numerals 30 and 32 appear to be pointing to the same part of the figure and a correction is needed to be able to determine one from the other. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the

remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 7 and 12-20 are objected to because of the following informalities:

Claims 7 and 17 are objected to because the last two lines of each claim are the same limitation. The claims read, "hybrid attributes comprise anomalously high absorption/low acoustic impedance zones, anomalously high absorption/high acoustic impedance zones, anomalously low absorption/low acoustic impedance zones, and anomalously low absorption/low acoustic impedance zones." The last line contains the same low/low relationship as the line above it, and therefore does not further limit the claim. It appears that the last line was meant to state a "low absorption/high acoustic impedance" relationship. For the purposes of this action, the last line of claims 7 and 17 will be interpreted as having this low/high relationship in order to fit with the rest of the claim language in 7 and 17.

Claims 12-20 are written as dependent from claims 10 or 1, or from claims that depend from claim 10. These claims refer to a program described in claim 11 and not claims 10 or 1. It is understood that the claims should depend from claim 11 instead of

claim 10 or 1. For the purposes of this action, the claims will be dealt with as if they depend from claim 11.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5-6, 9, 11, 15-16, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Kelly.

With regard to claim 1, Kelly discloses a method for processing seismic data to detect anomalously absorptive zones. Kelly discloses joint time-frequency decomposing seismic traces. Kelly discloses low frequency bandpass filtering the decomposed traces to determine a general trend of mean frequency and bandwidth of the seismic traces. Kelly discloses high frequency bandpass filtering the decomposed traces to determine local variations in the mean frequency and bandwidth of the seismic traces, whereby anomalous zones are determined when the local variations deviate from the general trend (Abstract, Column 1, Line 48 to Column 3, Line 5; Column 7, Line 46+ to Column 8, Line 8) (Figs. 1-6). Kelley discloses using seismic traces that have been preprocessed and looking at their change in frequency in relation to time (joint time/frequency decomposition) (Fig. 3). Although Kelly does not use the word

trend when talking about the low pass filtering, he does disclose that the low pass filtered data is compared to the high pass filtered data in order to determine differences. This is the same as comparing trends of low and high pass filtering.

With regard to claim 5, Kelly discloses spectrally balancing the decomposed traces and inversion processing the spectrally balanced decomposed seismic traces to determine relative acoustic impedances (Abstract, Columns 1 and Column 2).

With regard to claim 6, Kelly discloses determining hybrid attributes of the seismic traces from the low and high frequency bandpass filtered traces and the relative acoustic impedances (Column 2, Line 42 to Column 3, Line 5).

With regard to claim 9, Kelly discloses that an anomalously high absorbing zone is identified when the local variation indicates a bandwidth and RMS frequency lower than the bandwidth and RMS frequency of the general trend (Columns 4 and 5; Column 9, Lines 1-20).

With regard to claim 11, Kelly discloses a computer program stored in a computer readable medium, the program including logic operable to cause a programmable computer to perform steps comprising joint time-frequency decomposing seismic traces, low frequency bandpass filtering the decomposed traces to determine a general trend of mean frequency and bandwidth of the seismic traces, and high frequency bandpass filtering the decomposed traces to determine local variations in the mean frequency and bandwidth of the seismic traces, whereby anomalous zones are determined when the local variations deviate from the general trend (Abstract, Column 1, Line 48 to Column 3, Line 5; Column 7, Line 46+ to Column 8, Line 8) (Figs. 1-6).

Kelley discloses using seismic traces that have been preprocessed and looking at their change in frequency in relation to time (joint time/frequency decomposition) (Fig. 3). It is obvious from the drawings and from the calculations involved that a computer program was used. Although Kelly does not use the word trend when talking about the low pass filtering, he does disclose that the low pass filtered data is compared to the high pass filtered data in order to determine differences. This is the same as comparing trends of low and high pass filtering.

With regard to claim 15, Kelly discloses logic operable to cause the computer to spectrally balancing the decomposed traces and inversion processing the spectrally balanced decomposed seismic traces to determine relative acoustic impedances (Abstract, Columns 1 and Column 2).

With regard to claim 16, Kelly discloses logic operable to cause the computer to perform determining hybrid attributes of the seismic traces from the low and high frequency bandpass filtered traces and the relative acoustic impedances (Column 2, Line 42 to Column 3, Line 5).

With regard to claim 19, Kelly discloses that an anomalously high absorbing zone is identified when the local variation indicates a bandwidth and RMS frequency lower than the bandwidth and RMS frequency of the general trend.

Claims 1, 5, 8, 11, 15, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Calvert (US20020042702).

With regard to claim 1, Calvert discloses a method for processing seismic data to detect anomalously absorptive zones. Calvert discloses joint time-frequency decomposing seismic traces. Calvert discloses low frequency bandpass filtering the decomposed traces to determine a general trend of mean frequency and bandwidth of the seismic traces. Calvert discloses high frequency bandpass filtering the decomposed traces to determine local variations in the mean frequency and bandwidth of the seismic traces, whereby anomalous zones are determined when the local variations deviate from the general trend (Paragraphs [0012]-[0019]; [0040]-[0048]).

With regard to claim 5, Calvert discloses spectrally balancing the decomposed traces and inversion processing the spectrally balanced decomposed seismic traces to determine relative acoustic impedances ([0021]).

With regard to claim 8, Calvert discloses that at least one of the low frequency and high frequency bandpass filtering is weighted with respect to an envelope of the seismic traces ([0042]).

With regard to claim 11, Calvert discloses a computer program stored in a computer readable medium, the program including logic operable to cause a programmable computer to perform steps comprising joint time-frequency decomposing seismic traces, low frequency bandpass filtering the decomposed traces to determine a general trend of mean frequency and bandwidth of the seismic traces, and high frequency bandpass filtering the decomposed traces to determine local variations in the mean frequency and bandwidth of the seismic traces, whereby anomalous zones are

determined when the local variations deviate from the general trend (Paragraphs [0012]-[0019]; [0040]-[0048]).

With regard to claim 15, Calvert discloses logic operable to cause the computer to spectrally balancing the decomposed traces and inversion processing the spectrally balanced decomposed seismic traces to determine relative acoustic impedances ([0021]).

With regard to claim 18, Calvert discloses that at least one of the low frequency and high frequency bandpass filtering is weighted with respect to an envelope of the seismic traces ([0042]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5-6, 8, 11, 15-16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over He in view of Lance and Thurston.

With regard to claims 1 and 11, He discloses a method for processing seismic data to detect anomalously absorptive zones (Column 2, Lines 21-40). He discloses joint time-frequency decomposing seismic traces (Column 2, Line 48 to Column 3, Line 30; Column 4, Lines 45-62). He discloses using 4-D data dynamically extracting seismic wavelets, which have frequency components and time components. Therefore,

He is time-frequency decomposing the traces since they can be separated into their time and frequency components for data analysis. He discloses determining a general trend in the form of a low-frequency trend from acoustic impedance data (Figs. 2a-d) (Column 5, Line 47 to Column 6, Line 60). He discloses that anomalous zones are determined when the local variations deviate from the general trend (Column 3, Lines 18-30; Columns 7-8). He does not disclose high and low bandpass filtering, but does disclose finding the general trend from a polynomial regression. Thurston and Lance both disclose that polynomial regression is a type of bandpass filtering, and that a low filters can be used to find a general trend and that the high filtering can be used to find residuals (which are compared to the trend). This method of comparing residuals to the general trend to determine underground structures could be applied to the impedance calculations of He. Lance and Thurston teach that the polynomial regression used by He is a form of Bandpass filtering to find a general trend, and that residuals from a high frequency filter can be used to find residuals. Therefore, the method of He is using bandpass filters to find a trend and to find differences from the trend that indicate information about the underground structures, such as hydrocarbon reservoirs.

With regard to claims 5 and 15, He discloses spectrally balancing the decomposed traces and inversion processing the spectrally balanced decomposed seismic traces to determine relative acoustic impedances (whole document).

With regard to claims 6 and 16, He discloses determining hybrid attributes of the seismic traces from the low and high frequency bandpass filtered traces and the relative acoustic impedances.

With regard to claims 8 and 18, Lance discloses that at least one of the low frequency and high frequency bandpass filtering is weighted with respect to an envelope of the seismic traces. It would have been obvious to modify He to include weighting one of the filters as disclosed in Lance in order to determine variations in the underground formation.

Allowable Subject Matter

Claims 2-4 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 7, 12-14, 17, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and also if amended to overcome the objections to minor informalities in the claims stated earlier in this action.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sengupta, who discloses filtering seismic data.

Calvert (5808966).

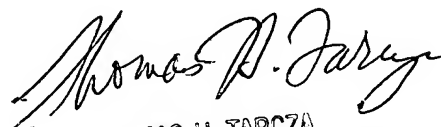
Ma, who discloses inversion of post-stack data.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on (571) 272-6979. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


SAH


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